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PATENT #16 7/29/04

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
TERRY COLE
CHARLES RAY BOSWELL, JR.

Serial No.: 09/514,843

Filed: February 28, 2000

For: METHOD AND APPARATUS FOR BUFFERING DATA SAMPLES IN A SOFTWARE BASED ADSL MODEM

Examiner: TESFALDET BOCURE

Group Art Unit: 2631

Att'y Docket: 2000.036100

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APPEAL BRIEF

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Commissioner of Patents
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Sir:

Applicant hereby submits an original and two copies of this Appeal Brief to the Board of Patent Appeals and Interferences in response to the FINAL Office Action dated February 23, 2004.

The Assistant Commissioner is authorized to deduct the fee for filing this Appeal Brief ($330) from Advanced Micro Devices, Inc. Deposit Account No. 01-0365/TT3026 In the event the monies in that account are insufficient, the Assistant Commissioner is authorized to withdraw funds from Williams, Morgan & Amerson, P.C. Deposit Account No. 50-0786/2000.036100.

I. REAL PARTY IN INTEREST

The present application is owned by Advanced Micro Devices, Inc. The assignment of the present application to Advanced Micro Devices, Inc., is recorded at Reel 010651, Frame 0202.

II. RELATED APPEALS AND INTERFERENCES

Applicant is not aware of any related appeals and/or interferences that might affect the outcome of this proceeding.

III. STATUS OF THE CLAIMS

Claims 1-30 are pending in the application. The claims as currently pending are attached as Appendix A. Claims 9-10 have been allowed by the Examiner. Claims 1, 11-13, 16, and 23-25 stand rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Weaver, et al (U.S. Patent No. 4,882,754). Claims 2-5, 3-7, 14-15, 17-22, and 26-30 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Weaver. Claim 8 stands rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Weaver in view of Mirfakhraei (U.S. Patent No. 6,570,912).

IV. STATUS OF AMENDMENTS

Claims 9 and 10 were amended after the final rejections to rewrite these claims in independent form. As stated above, the amended claims were allowed by the Examiner in the Advisory Action mailed March 26, 2004 and are not the subject of this appeal.

V. SUMMARY OF THE INVENTION

Digital Subscriber Line (DSL) technology uses digital signal processing (DSP) to increase throughput and signal quality through common copper telephone wire so that existing networks of telephone lines may carry broadband communications. For example, an ordinary twisted pair line equipped with DSL interfaces can transmit video, television, and high-speed data over a Plain Old Telephone System (POTS). One popular version of the DSL technology is the Asymmetric Digital Subscriber Line (ADSL) technology. ADSL modems transmit and receive data according to two competing modulation schemes: discrete multi-tone (DMT) and carrier-less amplitude/phase modulation (CAP).

Modems, such as those used in ADSL systems, generally transmit and receive data in real-time. However, the modems may also be used to transmit and/or receive non-real-time data. During non-real time operations, the modems do not always receive necessary support data in a timely manner, *i.e.* a latency problem may occur, which may interfere with the normal operation of the modem. For example, in a normal mode of operation, a sample buffer in a receiver in a modem receives and holds samples before transferring the samples directly to an alignment and equalizing unit. But when a latency problem occurs in the receiver, the sample buffer may not be able to hold all of the samples. See Patent Application, pg. 15, ll. 22-25.

Thus, with regard to independent claims 1, 11, 16, and 23 Applicants describe and claim methods, and corresponding apparatuses, for determining if samples of data being received will exceed the storage capacity of a buffer. The number and/or size of the samples stored in the buffer may then be reduced by deleting and/or compressing selected samples of data from the

buffer in response to determining that the samples of data being received will exceed the storage capacity of the buffer, as described in more detail below.

With particular regard to independent claims 1 and 16, Applicants describe and claim deleting selected samples of data from the buffer in response to the storage capacity being exceeded and reconstituting the selected samples of data deleted from the buffer. For example, when a latency problem occurs in a receiver 310, and a sample buffer 505 cannot hold all of the samples, a buffer control 510 will delete some of the samples from the buffer 505. In one embodiment, the buffer control 510 may delete samples in contiguous blocks at the head, end, or middle of the buffered data within the sample buffer 505. The buffer control 510 will store the precise starting and ending location of any deleted samples and transfer this location information to the receive software running on the control unit 315 along with the remaining samples from the sample buffer 505 such that the deleted data may be reconstituted. Alternatively, the buffer control 510 may delete the samples of the sample buffer 505 corresponding to every nth sample. The buffer control 510 would also record the exact start, stop, and step used, and transfer this information to the receive software running on the control unit 315 along with the remaining samples. See Patent Application, pages 15-16 and Figures 3 and 5.

With particular regard to independent claims 11 and 23, Applicants describe and claim compressing the samples of data from the buffer in response to the storage capacity being exceeded and decompressing the samples of data that were compressed. For example, when a latency problem occurs in a receiver 310, and a sample buffer 505 cannot hold all of the samples, the data in the sample buffer 505 may be compressed. The buffer control 510 records the exact

location where the compression occurred, and transfers this information to the receiver software so that the compressed samples may be expanded and restored. In one embodiment, the buffer control 510 may employ a piecewise linear compression scheme to compress the data in the sample buffer 505.

VI. ISSUE ON APPEAL

Appellant respectfully requests that the Board review and overturn the three rejections present in this case. The following issues are presented on appeal in this case:

(A) Whether claims 1, 11-13, 16, and 23-25 are anticipated by Weaver, et al (U.S. Patent No. 4,882,754);

(B) Whether claims 2-5, 3-7, 14-15, 17-22, and 26-30 are obvious over Weaver; and

(C) Whether claim 8 is obvious over Weaver in view of Mirfakhraei (U.S. Patent No. 6,570,912)?

VII. GROUPING OF THE CLAIMS

For the issues presented above, claims 1-8 and 11-30 may be considered to stand or fall together.

VIII. ARGUMENT

A. Claims 1, 11-13, 16, and 23-25 are not anticipated by Weaver.

Weaver is directed to a data reduction system for use in audio transmitters and receivers. The system described by Weaver includes a transmitter having a buffer 36 and a receiver having a buffer 50. A buffer fullness detector 44 determines a fullness of the buffer 36 and provides a

buffer fullness signal, F, to a logic unit 24, which uses the buffer fullness signal to determine how much truncation, if any, should be employed at a truncation unit 22. See Weaver, col. 6, ll. 11-17 and Figure 1. The truncation unit 22 may set one or more least significant bits of the sample signal stream to zero, or one, under control of the logic unit 24. See Weaver, col. 4, ll. 38-42. The truncated sample signal stream may be provided to the buffer 36 and then transmitted to the receiver using a channel 38. A digital decoder 56 in the receiver decodes the encoded signals, which are supplied to a reconstruction filter 58 and then to a digital-to-analog converter 60 for conversion to analog form. See Weaver, col. 6, ll. 32-44 and Figure 2.

An anticipating reference, by definition, must disclose every limitation of the rejected claim in the same relationship to one another as set forth in the claim. *In re Bond*, 15 U.S.P.Q.2d (BNA) 1566, 1567 (Fed. Cir. 1990). Weaver does not, however, disclose every limitation of claims 1, 11, 16, and 23. In particular, Weaver does not describe or suggest deleting (as set forth in claims 1 and 16) or compressing (as set forth in claims 11 and 23) selected samples of data from the buffer in response to the storage capacity being exceeded. In contrast, Weaver teaches truncating the received signal (*i.e.* the sample signal stream) before it is provided to the buffer. Furthermore, Weaver does not describe or suggest reconstituting the selected samples of data deleted or compressed. For at least the aforementioned reasons, it is respectfully submitted that claims 1, 11-13, 16, and 23-25 are not anticipated by Weaver.

B. Claims 2-5, 3-7, 14-15, 17-22, and 26-30 are not obvious over Weaver.

To establish a *prima facie* case of obviousness, the prior art reference (or references when combined) must teach or suggest all the claim limitations. *In re Royka*, 490 F.2d 981, 180

U.S.P.Q. 580 (CCPA 1974). As discussed above, Weaver does not teach or suggest all the limitations of the present invention. In particular, Weaver does not teach or suggest deleting (as set forth in claims 1 and 16) or compressing (as set forth in claims 11 and 23) selected samples of data from the buffer in response to the storage capacity being exceeded, or reconstituting the selected samples of data deleted or compressed. Weaver appears to be completely silent with regard to reconstituting the selected samples of data deleted or compressed.

A determination of obviousness also requires some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Weaver, however, fails to provide any suggestion to modify the prior art to arrive at the invention set forth in claims 1, 11, 16, 23, and all claims depending therefrom. In particular, Weaver teaches that by truncating the sample signal stream before it is provided to the buffer, transmitter buffer overflow is substantially eliminated. See Weaver, col. 2, ll. 24-25. Thus, there appears to be no reason to modify the teachings of Weaver to include deleting or compressing samples from the buffer.

Weaver also appears to teach away from the claimed invention. Weaver teaches truncating the received signal (*i.e.* the sample signal stream) before it is provided to the buffer, which appears to teach away from deleting (as set forth in claims 1 and 16) or compressing (as set forth in claims 11 and 23) selected samples of data from the buffer. It is by now well established that teaching away by the prior art constitutes *prima facie* evidence that the claimed invention is not obvious. *See, inter alia, In re Fine,* 5 U.S.P.Q.2d (BNA) 1596, 1599 (Fed. Cir.

1988); *In re Nielson*, 2 U.S.P.Q.2d (BNA) 1525, 1528 (Fed. Cir. 1987); *In re Hedges*, 228 U.S.P.Q. (BNA) 685, 687 (Fed. Cir. 1986).

For at least the aforementioned reasons, it is respectfully submitted that claims 2-5, 3-7, 14-15, 17-22, and 26-30 are not obvious over Weaver.

C. Claim 8 is not obvious over Weaver in view of Mirfakhraei.

Claim 8 depends from claim 1. In rejecting claim 8, the Examiner relies on Mirfakharaei to teach a transmission system for transmitting voice and data comprising a symbol alignment and time equalizer circuit. However, Mirfakharaei does not remedy the aforementioned deficiencies of the primary reference. Thus, for at least the aforementioned reasons, it is respectfully submitted that claim 8 is not obvious over Weaver in view of Mirfakhraei.

IX. CONCLUSION

In view of the foregoing, it is respectfully submitted that the Examiner erred in rejecting claims 1-8 and 11-30 over the prior art of record. The undersigned may be contacted at (713) 934-4052 with respect to any questions, comments or suggestions relating to this appeal.

Respectfully submitted,

Date: 7/6/04

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AGENT FOR APPLICANTS

APPENDIX A

1. A method, comprising:

determining if samples of data being received will exceed the storage capacity of a buffer;

deleting selected samples of data from the buffer in response to the storage capacity being exceeded; and

reconstituting the selected samples of data deleted.

2. The method of claim 1, wherein deleting selected samples of data from the buffer in response to the storage capacity being exceeded, further comprises:

deleting selected samples in contiguous blocks of the buffered data within the buffer.

3. The method of claim 1, wherein deleting selected samples of data from the buffer in response to the storage capacity being exceeded, further comprises:

deleting selected samples by every nth sample of the buffered data within the buffer.

4. The method of claim 2, wherein deleting selected samples in contiguous blocks of the buffered data within the buffer, further comprises:

recording the locations of a starting and ending point defining the continuos block being deleted.

5. The method of claim 4, wherein reconstituting the selected samples of data deleted, further comprises:

reconstituting the selected samples of data deleted based in part upon the recorded locations.

6. The method of claim 3, wherein deleting selected samples by every nth sample of the buffered data within the buffer, further comprises:

recording the locations of a starting and ending point defining the nth samples being deleted.

7. The method of claim 6, wherein reconstituting the selected samples of data deleted, further comprises:

reconstituting the selected samples of data deleted based in part upon the recorded locations.

8. The method of claim 1, further comprising:

performing symbol alignment and time domain equalization on the received samples from the sample buffer.

9. A method, comprising:

determining if samples of data being received will exceed the storage capacity of a buffer;

deleting selected samples of data from the buffer in response to the storage capacity being exceeded;

reconstituting the selected samples of data deleted; and

performing symbol alignment and time domain equalization on the received samples from the sample buffer in response to the storage capacity of the buffer not being exceeded.

10. A method, comprising:

determining if samples of data being received will exceed the storage capacity of a buffer;

deleting selected samples of data from the buffer in response to the storage capacity being exceeded;

reconstituting the selected samples of data deleted; and

performing symbol alignment and time domain equalization on the received samples from the sample buffer in response to the storage capacity of the buffer being exceeded after reconstituting the selected samples that were deleted.

11. A method, comprising:

determining if samples of data being received will exceed the storage capacity of a buffer;

compressing the samples of data from the buffer in response to the storage capacity being exceeded; and

decompressing the samples of data that were compressed.

12. The method of claim 11, wherein compressing the samples of data, further comprises:

rounding the samples of data from the buffer in response to the storage capacity being exceeded.

13. The method of claim 11, wherein compressing the samples of data, further comprises:

truncating the samples of data from the buffer in response to the storage capacity being exceeded.

14. The method of claim 12, wherein compressing the samples of data from the buffer in response to the storage capacity being exceeded, further comprises:

recording the locations of a starting and ending point defining the data being compressed.

15. The method of claim 14, wherein decompressing the samples of data that were compressed, further comprises:

decompressing the samples of data that were compressed based in part upon the recorded locations.

16. An apparatus, comprising:

a receiver adapted to receive samples of data;

a buffer adapted to store the received samples of data; and

a controller adapted to determine if samples of data being received will exceed the storage capacity of the buffer, delete selected samples of data from the buffer in response to the storage capacity being exceeded, and reconstitute the selected samples of data deleted.

17. The apparatus of claim 16, wherein the controller is further adapted to delete selected samples in contiguous blocks of the buffered data within the buffer.

18. The apparatus of claim 16, wherein the controller is further adapted to delete selected samples by every nth sample of the buffered data within the buffer.

19. The apparatus of claim 17, wherein the controller is further adapted to record the locations of a starting and ending point defining the continuous block being deleted.

20. The apparatus of claim 19, wherein the controller is further adapted to reconstitute the selected samples of data deleted based in part upon the recorded locations.

21. The apparatus of claim 18, wherein the controller is further adapted to record the locations of a starting and ending point defining the nth samples being deleted.

22. The apparatus of claim 21, wherein the controller is further adapted to reconstitute the selected samples of data deleted based in part upon the recorded locations.

23. An apparatus, comprising:

a receiver adapted to receive samples of data;

a buffer adapted to store the received samples of data; and

a controller adapted to determine if samples of data being received will exceed the storage capacity of the buffer, compress the samples of data from the buffer in response to the storage capacity being exceeded, and decompress the samples of data that were decompressed.

24. The apparatus of claim 23, wherein the controller is further adapted to round the samples of data from the buffer in response to the storage capacity being exceeded.

25. The apparatus of claim 23, wherein the controller is further adapted to truncate the samples of data from the buffer in response to the storage capacity being exceeded.

26. The apparatus of claim 24, wherein the controller is further adapted to record the locations of a starting and ending point defining the data being compressed.

27. The apparatus of claim 26, wherein the controller is further adapted to decompress the samples of data that were compressed based in part upon the recorded locations.

28. The method of claim 1, wherein deleting the selected samples comprises determining at least one buffer location associated with the deleted samples.

29. The method of claim 28, wherein determining the at least one buffer location associated with the deleted samples comprises determining a starting and an ending buffer location associated with the deleted samples.

30. The method of claim 28, wherein reconstituting the selected samples of data deleted comprises reconstituting the selected samples of data deleted based in part upon the determined buffer location.